






The Future Ain't What It Used To Be

Stormwater Planning For Climate Disruption

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Stormwater Management Goals

-  Reduce The Volume and Rate of Runoff
-  Protect and Restore Habitat Damage
-  Reduce Contaminant Input

Management Tools

- ☁️ Require Controls on Development
- ☁️ Construct Stormwater Facilities
- ☁️ Repair Ecosystem Damage
- ☁️ Inspect and Maintain Facilities
- ☁️ Enforce Regulations
- ☁️ Education Programs
- ☁️ Monitor Effectiveness
- ☁️ Basin Planning

Long-Range Planning

-  Determine Desired Levels of Service
-  Identify Existing Problems
-  Consider Growth
-  Redevelopment

Analysis

 Rainfall Record

 Computer Models

- Event-based
- Continuous Simulations

 Calibration

- Storm Observations
- Monitoring

Predictions

Recent Rainfall Analysis

- Revised Intensity-Duration-Frequency Curves
- Future Trends

NOAA Forecasts

Other Literature

Stormwater Management Issues



How Can We Identify What the Future Will Look Like?

- Population Growth
- Development and Redevelopment
- Aging Infrastructure (I&I)
- Potential Change In Rainfall Pattern

Effects of Climate Change

 Warmer

 Possibly Wetter

 Higher Tide Levels

 Reduced Snow Pack

Concerns for Stormwater Managers

How Do We Address Uncertainties?

– More Total Rain Volume Would Mean:

- ✓ More Runoff
- ✓ More Erosion
- ✓ Habitat Damage
- ✓ Higher Groundwater Table
- ✓ More Inflow And Infiltration To Sewers
- ✓ More Landslide Potential

Concerns for Stormwater Managers

High Intensity Summer Storms

- Very Different Conveyance System Response
- Flooding on a Localized Level
- Existing Designs May Not Work Well
- High Contaminant Concentrations
- Parking Lot Runoff Increases Stream Temperatures

Concerns for Stormwater Managers

Traditional Designs Address Peak Flow Rate

- Size Of Pipe Or Ditch
- Detention

Reducing the Volume of Runoff

- Soil Amendments
- Vegetation
- Infiltration

Concerns for Stormwater Managers

Higher Tide Levels

- Flooding Of Low-lying Areas
 - ✓ Possible Need For Pumping
- Potential For Beach Erosion
 - ✓ Possible Outfall Damage
 - ✓ Sediment Deposition At Creek Mouths

Stormwater Design Considerations

Rural v. Urban Areas

- Design To Mimic Predevelopment Conditions or for Set Discharge Rate?

Assume Build-out Condition

- Pavement Changes More Than Rain Does
- Low Impact Development and Natural Drainage Systems Reduce Pavement

Stormwater Design Considerations

Stormwater Treatment Facilities

- Performance Dependent on Flow Rate and Contaminant Concentrations
- Changes in Rainfall Pattern May Affect Effectiveness
- Time Between Storms is an Issue

Questions for Stormwater Managers


 Should We Revise Our Planning to Cope with the Possibilities?

- We Currently Update Our Rainfall Data Periodically.
- Change Will Be Gradual, But We Design for Long Life.

Questions for Stormwater Managers

- ☁️ What Threshold of Change Would Trigger Us to do Things Much Differently?
 - If We Get 5% More Rain Over the Winter, Would Our Designs Change?

Questions for Stormwater Managers

 How Can We Reduce Temperature Increases in Urban Lakes and Streams?


- Warmer Water Affects the Biota.
- Design Standards Should Address Temperature Issues.

Questions for Stormwater Managers

 What Kind Of Staffing Expertise Do We Need To Have?

- We Have Engineers, Biologists, and Economists Now.
- Should We Add Meteorologists?

Questions for Stormwater Managers

 How Do We Gather Information to Answer Questions and Reduce Uncertainties?